We first have to examine the theory itself thoroughly, and then draw the conclusions.

Now, when Prof. Keith states that Klaatsch speaks about a descent of man *via* the gorilla or *via* the orang, this is wrong, as I hope to have made clear by the quotations of Klaatsch's paper. But when Prof. Keith speaks about "convergence phenomena," to which has to be ascribed a great deal, he no doubt touches the point most exposed to criticism. It is, indeed, very difficult to believe in two races, so much one like the other as man is to man, and yet so unlike in some minute morphological detail, as Aurignac is to Neanderthal, without supposing that they once were very much more unlike, and that they afterwards got more alike again by convergence. But this difficulty of Klaatsch's theory must never make us forget the facts. The problem is this. There are two distinct "races" each possessing distinct morphological characters, the one resembling the orang in these characters, the other the gorilla. How can these differences and likenesses be explained? It is certainly a very difficult problem, but a very interesting one too, that is well worthy to receive serious consideration. In any case, we must be grateful to Klaatsch for having directed attention to this fact, and for offering us an explanation—even if the latter should be only a preliminary one. GERHARDT V. BONIN.

Breslau, January 28.

WHILE admiring the manner in which Herr Bonin states the case for his Professor, I do not think he has produced any evidence that requires me to alter my statement that Prof. Klaatsch's latest theory of the origin of human races is founded on a "flimsy" basis. To understand the nature of Prof. Klaatsch's "pan-anthropoid" theory of the origin of human races, it is necessary to know the circumstances which led him to formulate it. He found that the recently discovered Quaternary individual, which he has dignified with the name of *Homo aurignacensis hauseri*—quite a modern type of man—followed closely in point of time the individual he described in 1908 as *H. moustieriensis hauseri*—a man of the Neanderthal type. To account for the manner in which these two quickly succeeding types differ, Prof. Klaatsch propounded the "theory" that the Aurignac man is descended from the orang stock, while the Neanderthal has arisen in the gorilla line of descent. Now the characters which separate those two types are exactly of the same nature and of the same degree as separate a blood-horse from a Shire stallion. Every one of the points cited to differentiate these two types of men are dependent on the degree of muscular development. Bones, especially limb bones, react sensitively to the muscles which move them; muscular impressions and processes for the insertion of muscles vary from individual to individual, and from their nature are most untrustworthy for the purpose of tracing affinities.

There is thus, in my opinion, no need to have recourse to such a theory as Prof. Klaatsch has formulated to explain the contrasted characters of the Aurignac and Neanderthal types of men; the problem is of the same nature as meets us when we seek to explain contrasted breeds among dogs and horses. Further, from a study of acromegaly, that most interesting disease of growth which I have had opportunities of examining of late, it is quite apparent that an alteration in the action of the glands of internal secretion—especially of the pituitary—will change in the course of a few years a man of the Aurignac type into one of the Neanderthal type—not an exact replica, but near enough to leave no doubt that the characters of acromegalics and of Neanderthal men are of the same nature.

Prof. Klaatsch also realised that if his theory were applicable to two races of men, it should hold true for all. Hence his suggestion that some may have arisen from the chimpanzee and some from the gibbon. His theory—a "pan-anthropoid" theory—of the origin of human races is designed to account for the various features which characterise and differentiate human races.

To those acquainted with the great mass of evidence which has accumulated in recent years relating to the structure, development, and habits of living and extinct anthropoids, Prof. Klaatsch's theory must appear altogether untenable. From 1890 to 1900 I devoted myself to an investigation of the Higher Primates, making complete dissections of more than eighty animals, and collected all descriptions which had been published at the close of that period, with the intention of tracing, from the mass of facts thus collected, the evolutionary history, not only of man, but of each of the anthropoids. An extensive analysis was made of the structural characters of each of these animal forms. Characters are found in them which also occur in lemurs, in South American monkeys, in old-world monkeys. Some characters are common to all the members of the Higher Primates (man, gorilla, chimpanzee, orang, and gibbon); others which are common to the Giant Primates (man, gorilla, chimpanzee, and orang); others which are found only in man, the gorilla, and chimpanzee; and then a considerable number which are peculiar to each member, and may be regarded as late acquisitions.

The characters I relied on were not such as Prof. Klaatsch has used—the highly variable muscular impressions on bones—they were points such as, I believe, most anatomists would regard as of morphological worth. Publication of my results was suspended owing to several circumstances; and I do not regret the fact, because since then much additional evidence has been discovered, such as the affinities shown by blood tests and by susceptibility to disease, and much of an anatomical and physiological nature, which I hope to gather and systematise. Meantime, I merely state briefly the results reached more than ten years ago. Whatever theory is propounded of the origin of the several members of the Higher Primates must account for their structural and functional characters. It is certain that Prof. Klaatsch's theory is altogether inapplicable for their explanation.

Table giving an Analysis of the Structural Characters of the Higher Primates.

Nature and Character	A Man	B Gorilla	C Chimpanzee	D Orang	E Gibbon
Peculiar to the genus (generic characters)	312	75	109	113	116
Common to A, B, C...	93	93	93	—	—
„ B, C ...	—	78	78	—	—
„ A and C..	98	—	98	—	—
„ A and B.	87	87	—	—	—
„ A, B, C, D	112	130	133	130	—
„ A and D..	56	—	—	56	—
„ C and D..	—	—	65	65	—
„ B and D..	—	78	—	78	—
„ A, B, C, D, E...	93	132	132	132	133
Common to E and A, B, C, or D	84	56	93	74	—
Common to Old World Monkeys and A, B, C, D, or E	53	144	172	213	323
Common to New World Monkeys and A, B, C, D, or E	60	33	32	38	76
Lemuroid Characters.	17	41	37	50	50
	1065	1004	980	949	1002

The manner in which I seek to explain the distribution of these characters is the following. The gibbon is regarded as the representative of the basal stock of the Higher Primates, and this Hylobatian stock is looked upon as an offshoot of a basal stock (late Eocene probably), which also gave rise to the Old and New World monkeys. The distribution of characters of these groups is thus explained in the modern representatives of the Higher Primates. The evolution of the Hylobatian form marks the first and most important stage in that process which led to man's upright posture. The body of the gibbon shows all the adaptations for an upright posture (perhaps downright would be a better term) in which the weight is more suspended from the arms than supported by the legs.

The next stage in the evolution of the Higher Primates is clearly the appearance of a form which, compared to all that had gone before, may be regarded as a "giant" stock. There can be no doubt the Giant Primates (man, gorilla, chimpanzee, and orang) arose from the Hylobatian stock, and that Dryopithecus (a Miocene form) is a very good example of an early Giant Primate. The first stage in the evolution of the Higher Primates is the acquisition of a new posture, the second the acquisition of a new stature. The orang does not possess a number of characters which are held in common by man, the gorilla, and chimpanzee, and I therefore suppose that the orang

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was the first to break off from the basal stem of the Giant Primates. The orang, although it has the giant size, has retained the brachiating or arm locomotion of the gibbon stock, his thumb and great toe have become vestiges; the process of shortening of the spinal column, which set in during the Hylobatian stage, has progressed, so that now the lower limbs are attached to the body one or two vertebræ higher than in man, the gorilla, and chimpanzee. It has retained a primitive arrangement of the air cavities of the nose and face, whereas man, the gorilla, and chimpanzee have the same elaborate arrangement of cells which differentiate them from all other primates.

The orang's lower limbs are in a state of retrogression—as opposite to human limbs as could be. The Aurignac man, which Prof. Klaatsch assigns to the orang stock, is remarkable for his narrow and long head, whereas the orang's head is the most rounded of all primate forms. The resemblance between the humerus of the Aurignac man and that of the orang is fanciful, in my opinion. If we may judge the basal orang stock from its modern descendants, the one thing we can be certain of is that it is the last of the Higher Primate stocks which is likely to give rise to the human race. On the other hand, the chimpanzee, and especially the gorilla, are evidently the descendants of a stock from which it is not difficult to suppose the primary human stock may have arisen. The tendency to a greater use of the lower limbs was evidently already present in that primitive stock.

The conclusion I reached in 1900 simply confirmed the statements made by Huxley in 1863.

Nothing is impossible in nature, but there are some things which are highly improbable. A multiple origin for a single species is one of the most improbable, and, so far as the human species is concerned, there is no need to suppose a multiple origin. Prof. Klaatsch's opinion of anthropoid apes throws an interesting light on his theory. He has reverted to a slight modification of the very ancient view of the anthropoids—that they are representatives of retrograde humanity. In Herr Bonin's words, Klaatsch regards the gorilla and the other man-like apes as "failed experiments of man." There is no scientific basis for such a statement—the gorilla fills its place in nature quite as satisfactorily as man.

This view of the nature of the anthropoids only affects us so far as it may help us to understand Prof. Klaatsch's theory of the "pan-anthropoid" origin of human races. If that opinion is well founded, the opinion that the Higher Primates were designed as experiments in "Menschwerdung," then, of course, it follows that the experimenter may have succeeded on several occasions, and that each of the primitive primates may have given rise to races of men. In reality, we are being again introduced to the old theory of design, and hence the statement in my last letter that Prof. Klaatsch's theory exceeded "the limits of rational speculation."

A. KEITH.

Royal College of Surgeons, England, February 4.

"In Forbidden Seas."

"D. W. T.," who writes a review of the sea-otter, or rather of a book called "In Forbidden Seas," in NATURE of January 26, tells us that he is not aware that any living naturalist has ever seen this animal in its natural state. Now, Captain H. J. Snow, who is the author of "In Forbidden Seas," is, from my point of view, a first-class field naturalist, who by his collections and observations has added considerably to zoological and geological knowledge. I may add that he is also a keen surveyor, and his maps of the islands in these "Forbidden Seas" were so far back as 1895 published for the use of sailors by our Admiralty. By the publication of these charts, the shortest routes between Vancouver and certain ports on the Asiatic coast have been freed from uncertainties and dangers. Canadian and other vessels crossing the North Pacific, in cases of emergency have new harbours of refuge which can be approached with comparative safety. Snow's charts show new rocks and shoals, take out others, adjust islands in longitude, indicate anchorages, tide rips, watering places, seal and seal-lion rookeries, and, in short, make the unknown known. Sailing directions go with the charts.

By reason of their knowledge of these Forbidden Seas and our ignorance of them, in 1855 the Russian fleet was enabled to evade that of the French and English allies. H.M.S. *Rattler* was wrecked in these seas, and the Japanese man-of-war *Tabor* was totally lost. The disabling of several gunboats which have attempted to survey these islands, and the numerous wrecks of British and other schooners which are to be found along their shores, testify to the difficulties which surround the navigation of these waters before the advent of Captain Snow. The Royal Geographical Society were so impressed by the value of his work that they awarded him one of their annual grants, and approached the Lords of the Admiralty to obtain for its author substantial recognition. Had the work been carried out by one of our surveying vessels it would have cost this country many thousands of pounds. All that was learnt was to the effect that no rule existed for the payment for work of this description. At a subsequent date the Rt. Hon. Arthur J. Balfour was approached. Among the signatories to the petition I see the name of the president of the Royal Geographical Society on behalf of the council, the Admiral of the Fleet, Rudyard Kipling, and those of many other well-known persons. Captain Snow gave up his working tools and received no recognition. I know that captains and admirals of British ships, like commissioners sent out to study seal fisheries, have sought and obtained valuable information from Captain Snow. JOHN MILNE.

Shide, Newport, Isle of Wight, January 30.

I AM surprised and sorry that Prof. Milne should think, as he seems to do, that I sought to belittle Captain Snow's achievements, for I not only based my article on the sea-otter upon Captain Snow's additions to zoological knowledge, but I also paid an unstinted compliment to Captain Snow's romantic and adventurous career. I mentioned briefly that Captain Snow had won the reputation of an authority on the geography of the Kuriles; but that brief statement, brief because I was not dealing with, and was, indeed, very imperfectly acquainted with, his geographical work, was necessarily inadequate. Prof. Milne has done proper justice to this part of Captain Snow's work.

As regards the valuable information that Captain Snow has given to persons charged with the inspection of the seal-fisheries, I can bear testimony of my own. Still better testimony can be found, for instance, in Dr. L. Stejneger's report of 1898 on the Asiatic fur-seal islands, for Dr. Stejneger not only draws his description of the Kurile seal-rookeries chiefly from Captain Snow, but pays tribute to his "invaluable additions to the authentic history of the Kuriles," and to himself as "a man of unusual ability, literary and scientific, for the profession he had chosen to follow."

D'ARCY W. THOMPSON.

An Apparently hitherto Unnoticed "Anticipation" of the Theory of Natural Selection.

IN Louden's *Magazine of Natural History*, 1835, pp. 40–53, there appears an article entitled "An attempt to classify the 'Varieties' of Animals, with observations on the marked Seasonal and other Changes which naturally take place in various British Species and which do not constitute Varieties," by Mr. Edward Blyth. Certain passages contained therein seem to indicate that the principle of natural selection, or the survival of the fittest, was clearly understood by Blyth in 1835, and, further, that he recognised its application to artificial selection. Moreover, he demonstrates the idea of sexual selection in one of its bearings. I have therefore considered them of sufficient interest to be made public, as it appears they have hitherto escaped notice.

"When two animals are matched together, each remarkable for a certain peculiarity, no matter how trivial, there is also a decided tendency in nature for that peculiarity to *increase*; and if the produce of these animals be set apart, and only those in which the same peculiarity is most apparent, be selected to breed from, the next generation will possess it in a still *more* remarkable degree; and so on, till at length the variety I designate a *breed*, is formed, which may be very unlike the original type." . . . "It is worthy of remark, however, that the original and typical

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